<http://www.time.com/time/magazine/article/0,9171,989987,00.html>   
  
Until just a few years ago, making a baby boy or a baby girl was pretty much a hit-or-miss affair. Not anymore. Parents who have access to the latest genetic testing techniques can now predetermine their baby's sex with great accuracy--as Monique and Scott Collins learned to their delight two years ago, when their long-wished-for daughter Jessica was born after genetic prescreening at a fertility clinic in Fairfax, Va.

And baby Jessica is just the beginning. Within a decade or two, it may be possible to screen kids almost before conception for an enormous range of attributes, such as how tall they're likely to be, what body type they will have, their hair and eye color, what sorts of illnesses they will be naturally resistant to, and even, conceivably, their IQ and personality type.

In fact, if gene therapy lives up to its promise, parents may someday be able to go beyond weeding out undesirable traits and start actually inserting the genes they want--perhaps even genes that have been crafted in a lab. Before the new millennium is many years old, parents may be going to fertility clinics and picking from a list of options the way car buyers order air conditioning and chrome-alloy wheels. "It's the ultimate shopping experience: designing your baby," says biotechnology critic Jeremy Rifkin, who is appalled by the prospect. "In a society used to cosmetic surgery and psychopharmacology, this is not a big step."

The prospect of designer babies, like many of the ethical conundrums posed by the genetic revolution, is confronting the world so rapidly that doctors, ethicists, religious leaders and politicians are just starting to grapple with the implications--and trying to decide how they feel about it all.

They still have a bit of time. Aside from gender, the only traits that can now be identified at the earliest stages of development are about a dozen of the most serious genetic diseases. Gene therapy in embryos is at least a few years away. And the gene or combination of genes responsible for most of our physical and mental attributes hasn't even been identified yet, making moot the idea of engineering genes in or out of a fetus. Besides, say clinicians, even if the techniques for making designer babies are perfected within the next decade, they should be applied in the service of disease prevention, not improving on nature.

But what doctors intend is not necessarily what's going to happen. Indeed, the technology that permitted the Collinses family to pick the sex of their child was first used to select for health, not gender per se. Adapting a technique used on livestock, researchers at the Genetics & IVF Institute in Fairfax took advantage of a simple rule of biology: girls have two X chromosomes, while boys have one X and one Y. The mother has only Xs to offer, so the balance of power lies with the father--specifically with his sperm, which brings either an X or a Y to the fertilization party.

As it happens, Y chromosomes have slightly less DNA than Xs. So by staining the sperm's DNA with a nontoxic light-sensitive dye, the Virginia scientists were able to sort sperm by gender--with a high rate of success--before using them in artificial insemination. The first couple to use the technique was looking to escape a deadly disease known as X-linked hydrocephalus, or water on the brain, which almost always affects boys.

Read more: <http://www.time.com/time/magazine/article/0,9171,989987,00.html#ixzz1LD1hCUOV>

<http://today.ninemsn.com.au/healthandbeauty/284244/designer-babies>  **Most parents want to provide the best opportunities for their children in life, but where do you draw the line?**

Professor Julian Savulescu is a practical ethicist from Oxford University who argues that parents should have the opportunity to choose the genetic make-up of their child, ranging form hair colour to intelligence.

The basic idea is that we have already accepted using genetic testing to see if embryos have diseases," he says. "We're increasingly testing for adult onset conditions plus the susceptibility to diseases. We test for diseases because they make people's lives worse."

"Surely this means we should test for other things that impact on our happiness and reduce our ability to meet our goals?" suggests Professor Savulescu.

While Professor Savulescu is aware that there are people who believe that we should never intervene with nature; he disagrees.

"Some people will make mistakes when choosing some things about their children," explains Professor Savulescu. "There is a huge debate about what makes a good life. But people mostly agree on the big issues ... such as a child is better off being free of disease."

"I also know that if my child has an IQ less than 90, they are going to have some big difficulties in the most basic areas of their life," he says. "Issues relating to getting a job or filling out a tax form."

"Parents try to correct children's problems in everyday life," he says. "Here we will have the opportunity to do it right from the start."

"There are both environmental and genetic influences in what creates the personality of a child," he says. "Why not use both, environmental and biological, to give the opportunity to complement the social influences on our children?"

<http://au.todaytonight.yahoo.com/article/5380924/general/designer-babies>   
  
**While gender selection may be illegal here, Australian couples continue to employ overseas fertility clinics to determine the sex of their child.**

Up to 100 Australian couples have ignored the ban on sex selection, heading to fertility clinics in California and Bangkok.

By they time they pay for airfares and accommodation, that designer baby could cost them up to $50,000.

Through a freedom of information request, Today Tonight has found dozens of couples urging the Government to overturn the ban on sex selection.

Many seeking the treatment already have three or four children of the same sex.

Some couples argue that it is about their right to chose.

In some cases it's been found that the failure of the IVF sex selection process has led disappointed women to decide to have an abortion because they're not getting what they paid for.

The sex selection process generally involves implanting fertilised embryos that match the gender the parents want, and discarding the embryo of an undesired child. The controversial procedure was banned in Australia four years ago, and now it's only legally allowed if there's a genetic disorder.

For Dr. Lyndon Hale, CEO of the Melbourne IVF Clinic, the question of legality is a personal one.

"The questions on whether it should be legal here, it's really a personal point of view. If it was legal, I would be happy to facilitate that and individuals can make up their own mind," Dr. Hale said.

He has been approached by parents seeking advice on sex selection in the past. He can refer them to the internet, but no further.

Should he provide any other assistance he may face up to two years behind bars and a $26,000 fine.

Dozens of websites, including those set up by Australian companies, inform parents about the ways to undergo sex selection and even spruik the benefits.

And just as many web forums allow parents to anonymously discuss reasons for wanting the process.

"There are couples who don't have a genetic reason, but concerns about abnormality of one sex in the family, so there are couples who aren't doing it for flippant reasons," Dr Hale said.

Ethicist Dr. Nicholas Tonti-Fillipini says unborn children shouldn't be discriminated against because of their sex.

"The major issue here is of the gender being a condition under which you will be allowed to survive or not," Tonti-Fillipini said.

"Destroying embryos is a form of abortion in my book, I don't distinguish between an embryo and a six, eight, ten week foetus so it's the same in terms of loss of life."

"Well it's a form of designer baby or wanting the perfect baby and regarding a child as a product rather than as a person," Tonti-Fillipini said

<http://www.wired.com/wiredscience/2009/03/designerdebate/>

When a Los Angeles fertility clinic offered last month to [let parents choose their kids’ hair and eye color](http://online.wsj.com/article/SB123439771603075099.html), public outrage followed. On March 2, the clinic [shut the program down](http://www.fertility-docs.com/news_events.phtml?ID=23) — and that, says transhumanist author James Hughes, is a shame.

According to Hughes, using reproductive technologies — in this case, pre-implantation genetic diagnosis (PGD), in which doctors screen embryos before implanting them — for cosmetic purposes is just an old-fashioned parental impulse, translated into 21st century technology.

If nobody gets hurt and everybody has access, says Hughes, then genetic modification is perfectly fine, and restricting it is an assault on reproductive freedom. "It’s in the same category as abortion. If you think women have the right to control their own bodies, then they should be able to make this choice," he said. "There should be no law restricting the kind of kids people have, unless there’s gross evidence that they’re going to harm that kid, or harm society."

Hughes’ views are hardly universal. "I’m totally against this," said William Kearns, the medical geneticist who developed the techniques used by the Fertility Institutes for cosmetic purposes, in a [newspaper interview](http://www.telegraph.co.uk/news/worldnews/northamerica/usa/4885836/Designer-baby-row-over-clinic-that-offers-eye-skin-and-hair-colour.html). In the same article, Mark Hughes, one of the inventors of pre-implantation genetic diagnosis, called its non-therapeutic use "ridiculous and irresponsible."

Wired.com talked to James Hughes and to Marcy Darnovsky, associate executive director of the Center for Genetics and Society, about genetic selection.

**Wired.com:** What do you think about using reproductive technologies to pick cosmetic traits?

**James Hughes:** It’s inevitable, in the broad context of freedom and choice. And the term "designer babies" is an insult to parents, because it basically says parents don’t have their kids’ best interests at heart.

The only people who are consistent about this are the Catholics.  
They say that you have to accept whatever pops out of your procreative unions. But if you think that people have a right to choose how many children they have, or the partners they have them with — "I love you, but you’re just too short, or too ugly" — that’s a procreative choice.

f I’ve got a dozen embryos I could implant, and the ones I want to implant are the green-eyed ones, or the blond-haired ones, that’s an extension of choices we think are perfectly acceptable — and restricting them a violation of our procreative autonomy.

I want to see a society in which parents can say, I want my kids to have the best possible options in life. That might include getting rid of obesity genes. Every child should be a loved child, but there is no virtue in accident.

**Wired.com:** But one could argue that obesity is a health problem, not a cosmetic issue.

**Hughes:** So parents are only allowed to have preferences about health conditions? What if we discovered that eating fish oil while pregnant increases intelligence, which it does? We’re not going to say that you can’t make certain dietary choices. In fact, we encourage them.

And would we say it was morally inappropriate for parents to stand on their head during copulation, if it made their children blond? I doubt it. The only reason this is different is because it involves embryo selection.

**Wired.com:** But isn’t this going to produce a super-race of children born to people wealthy enough to afford artificial reproduction?

**Hughes:** Insofar as the choices are eye color and hair color, that’s not going to exacerbate inequalities in society. It’s a minor way in which greater wealth allows more reproductive choice, but it shouldn’t be a reason to override reproductive freedom.

If PGD had the ability to double the IQs of children — which it doesn’t  
— then that would be the sort of inequality that warranted a social policy against it. I’m worried about that situation, not hair and eye color.

Gross exacerbation of social inequality is a grave social harm. That’s why we need universal health care, and universal access to any technology which provides profound enablement.

**Wired.com:** It’s hard to imagine these ever being universally available.

**Hughes:**Medicaid has considered the provision of fertility services.  
Some say fertility isn’t a health issue — but I think that’s B.S. Having a saline breast implant put in after a mastectomy isn’t a health issue, but we pay for it, because it improves quality of life.

**Wired.com:** Some ethicists say that non-therapeutic reproductive technologies shouldn’t be used until the industry is better-regulated.

**Hughes:** Fertility clinics and reproductive medicine need a complete revamping of their regulatory structures. Many of the procedures are not being monitored for safety and efficacy. But those are the only two grounds on which to base a legitimate societal regulation.

**Wired.com:** Where do you draw the line? What if I want disabled children?

**Hughes:** We’ve been debating that for five or six years, ever since a deaf lesbian couple in Chicago wanted to use PGD to choose among the embryos they’d fertilized for one that inherited a form of deafness.  
They said that deafness is a perfectly benign condition, and that living in the hearing world is like living in the white world as a black person.

I argue in Citizen Cyborg that I wouldn’t want to see a law saying you can’t do this, but I’d want to see strong moral sanctions.

The reproductive autonomy of parents should be protected at a high level — and that even includes decisions that impose a degree of harm on children.

**Wired.com:** But what if I wanted to have a child who was deformed?

**Hughes:** I think a principle developed by Peter Singer is useful: If you think parents should be punished for taking that ability away from a child who’s already born, that’s probably harm.

<http://www.actionbioscience.org/biotech/agar.html>   
  
n 2004 the term “designer baby” made the transition from sci-fi movies and weblogs into the Oxford English Dictionary, where it is defined as “a baby whose genetic makeup has been artificially selected by genetic engineering combined with in vitro fertilization to ensure the presence or absence of particular genes or characteristics.”1 This coinage was prompted by recent advances in genetics that may make such babies possible. We need to pause and ask what moral or ethical limits, if any, should apply to the selection of our children’s genes or characteristics. Before we can answer this we must address other questions:

***What issues should we consider before modifying humans?***

* How would designer babies be made?
* Is there a moral or ethical difference between using genetic technologies to prevent disease and to enhance human capacities?
* Should we be striving to protect our humanity from genetic enhancement?
* What effect will human genetic modification have on society?

**Designer babies: Not today, but perhaps tomorrow**

There are two types of moral or ethical questions one can ask about designer babies. The first addresses the specific technologies that might be used to modify or select a baby’s genetic makeup. The second question looks away from technological details to focus on the very idea of a designer baby.2

***Is GM technology safe and ethical?***

* Are the technologies of genetic modification and selection safe enough to be used on humans?
* Even if the technologies are safe, can they be morally defended?

The Oxford English Dictionary definition describes the way of making designer babies that at the same time is the most conceptually straightforward and raises the biggest concerns about safety. One way to make a designer baby begins with an embryo created by in vitro fertilization (IVF). Genetic engineers modify the embryo’s DNA and then introduce it into a womb.

***Geneticists have enhanced learning in mice.***

Farmers in many parts of the world now plant crops with genomes altered to make them resistant to pests or herbicides.3 Recent discoveries about the influence of genes on human traits such as susceptibility to disease, shyness, and athletic ability open the possibility of transferring these techniques to human beings. An experiment on mice performed at Princeton University suggests one way this might be done.

Geneticists introduced into mouse genomes an additional copy of a gene, NR2B, that codes for one type of glutamate receptor and is known to play a role in the development of the brain.4 The resulting “doogie” mice, named for the teen genius central character of the early 1990s TV show “Doogie Howser, MD,” seem to learn faster than other mice and retain information longer. The NR2B gene exists in humans, prompting speculation about performing the same trick on one of us. Before this is done, we need to examine pressing safety concerns.

***There are several safety concerns about the technology.***

* Current techniques of genetic modification introduce genes at random places in the genome. We should be concerned about the possibility that an inserted copy of NR2B may arrive in the target genome in a way that disrupts the function of another gene crucial for survival.
* Many genes have more than one effect. The effect we intend may be accompanied by others of which we become aware only later. There is evidence for such effects on doogie mice, which seem not only to have improved powers of learning and memory, but also to have a greater sensitivity to pain, an enhancement of more dubious desirability.5
* Many of the traits that we may want to select are influenced by multiple genes. A gene affects intelligence only in combination with other genes. We are unlikely to find single genes whose modification would reliably produce a 20-point boost in IQ, for example.6

We should expand on the dictionary definition to consider other ways of selecting our children’s characteristics. These ways of making designer babies will avoid some of the risks inherent in the genetic modification of human embryos while introducing others. One technology is preimplantation genetic diagnosis (PGD), currently used by some people at risk of passing serious genetic disorders on to their children.

***Preimplantation genetic diagnosis is already used to screen for genetic defects.***

* People who use preimplantation genetic diagnosis to avoid passing on a disease to their child have a collection of embryos created for them by IVF.
* These embryos are grown to the eight-cell stage, at which point one or two cells are removed and checked for genetic variants associated with the disease.
* Only embryos lacking these variants are introduced into the womb.

PGD is an expensive procedure currently offered only to couples at risk of having a child suffering from a serious genetic disease. But there is nothing inherent in the technology that limits it to such uses. For example, Dean Hamer presents evidence that the gene for a vesicular monoamine transporter, VMAT2, influences a trait labelled self-transcendence, that is, the “capacity to reach out beyond themselves, to see everything as part of one great totality.”7 He proposes that different versions of VMAT2 lead to different degrees of self-transcendence and, therefore, to different propensities for religious or spiritual belief.

***One scientist argues you can also screen for personality traits.***

Hamer’s proposal is controversial, but suppose he is right. You might use PGD to select your child’s version of VMAT2. Presbyterians who select children with the high self-transcendence version of VMAT2 should, however, be warned that they may end up with a child who expresses this selected psychological characteristic by way of a devotion to astrology.

***Preimplantation genetic diagnosis is not risk free.***

PGD does not involve the genetic modification of human embryos and hence avoids some of the risks described above. But it is not entirely risk-free. Some commentators fear that the removal of one or two cells from eight-cell embryos might have implications for the well-being of people created by PGD. Defenders of PGD respond that the cells of eight-cell embryos are totipotent, meaning that they are undifferentiated and equally capable of forming all the cells of the human body. As the technology has been in use for under a decade, it is too early to say with certainty who is right in this dispute.8

Another biotechnology—cloning—may enable the selection of children’s characteristics.

***Cloning is an alternative method.***

* Cloning by somatic cell nuclear transfer uses a somatic, or body, cell from the person to be cloned.
* The nucleus of this cell is introduced into an egg cell whose own nucleus has been removed.
* The resulting reconstructed embryo is introduced into a womb.

Although some people may view cloning as a last-ditch response to infertility, others may see it as a way of selecting the characteristics of their child. This choice would be exercised through the choice of the person to be cloned. For example, you might pursue physical attractiveness on your child’s behalf by using a somatic cell from Angelina Jolie or Brad Pitt, who may, in the future, have to be more circumspect about where they leave their saliva and hair follicles.

***Cloning could lead to parental preference for an enhanced child.***

Those who hope to clone designer babies should be wary of genetic determinist misrepresentations of the technology.9 Genetic determinism is the view that an organism’s significant characteristics result mainly from the action of its genes, with environmental influences playing a negligible role. This view, now widely recognized as false, has been supplanted by the view that organisms emerge from a complex interaction of genes and environment. Roger Federer’s clone would be subjected to a different collection of environmental influences from the original, meaning that the clone might easily lack any interest in or aptitude for tennis. Prospective parents who accept that cloning comes with no guarantee might reassure themselves that a clone of Federer would be more likely to be a tennis champion than a child they produced naturally.

This way of making a designer baby will not be attractive to prospective parents who place value on a genetic connection with their child. The woman who gave birth to a clone of Roger Federer would be no more genetically related to the clone than she is to the original. She might establish a rather limited genetic connection by contributing the egg into which the nucleus of the Federer somatic cell is inserted. An enucleated egg retains the DNA of its mitochondria, cellular machinery residing outside of the nucleus. But the significance of this connection is vastly outweighed by that with the donor of the nucleus.

***Animal cloning has proven to be risky.***

Even if we understand how somatic cell nuclear transfer might enable us to make designer babies, we are not yet ready to create children by cloning. There are major concerns about the health of clones. Animal clones suffer from a variety of problems that some scientists connect with incomplete reprogramming of somatic cell DNA or damage inflicted by the process of nuclear transfer. Human clones may also suffer from these problems.10

**Preventing disease or enhancing attributes?**

Suppose we move away from discussion of risks to focus on the reasons for having a designer baby. We can identify two different kinds of motivation:

***Is there an ethical divide between therapy and enhancement?***

* Replacing the version of the gene linked with heart disease, for example, aims to ensure that the resulting person’s cardiac functioning does not fall below a level considered normal for humans. We call it “therapy” because we recognize that it aims to prevent a disease state.
* Adding an extra copy of the NR2B gene to a human embryo, on the other hand, has the quite distinct aim of producing someone who, in some area, functions beyond a level considered normal for human beings and as such qualifies as an “enhancement.”11

This prompts a question: Is there a moral distinction between treating or preventing disease and enhancing traits? Some think that we should pass different moral judgments on enhancement from those we pass on therapy. They say that while therapy is justifiable, enhancement is not.

***How do you distinguish between therapy and enhancement?***

The problem is that it is difficult to make the therapy–enhancement distinction principled. It is hard to find definitions of disease suitable to serve as a moral guideline for genetic technologies. Social constructivists consider diseases to be states to which society takes a negative attitude. Cancer seems to satisfy the requirements of this definition, but so might homosexuality and practicing a religion different from the norm in your society. Objectivist accounts avoid these difficulties by making the definition of disease independent of our attitudes. According to the most widely advocated version of this view, I suffer from disease when some part of me fails to perform its biological function. For example, cholesterol deposits on the arteries constitute or conduce to disease because they impede the heart in the performance of its function, which is to pump blood. The problem with this way of defining disease is that it may sometimes set goals irrelevant to human flourishing. Suppose we were to discover that homosexuality was a consequence of malfunction in the part of the brain responsible for sexual attraction. Should this rather obscure fact about biological functioning count more than the fact that many homosexual people seem to be living excellent lives?12

***Some technical options destroy the embryo to avoid genetic defects.***

A further moral complication emerges from the different approaches to treating disease and those who suffer from them. Genetically modifying an embryo so as to remove a gene linked with a higher than average risk of asthma may prevent asthma, but it need not prevent the existence of the person who might have suffered from it. Compare this with the use of PGD to avoid having a child at a high risk of asthma. This seems to prevent the disease only by preventing the patient’s existence.13

**Should parents be permitted to enhance their children?**

***The Nazis tried to design babies by practicing eugenics.***

Finding a difference between treatment and enhancement does not in itself show that enhancement is impermissible. Some think we should reject genetic enhancement because of its connection with the eugenics programs promoted by the Nazis. The scientific minions of Adolph Hitler sought to shape the German population by murdering those judged inferior and encouraging those they saw as their betters to reproduce. Advocates of what has come to be called “liberal eugenics” would take responsibility for human enhancement from the state and pass it to individuals who would be guided by their own distinctive values in their selection of genetic advantages.14

***Is the way parents rear a child also a way of designing a child?***

Parents in liberal democracies already make choices about which schools to send their children to, how to feed them, who counts as a suitable after-school companion, whether children are to be given religious instruction, and if so of what type. In effect, they manipulate their children’s environments to improve or enhance them.14–16 The moral parallel between upbringing and genetic enhancement draws support from modern understanding of the contributions that genes and environment make to human development. As we saw above, the genetic determinist view of development has been displaced by the view that organisms emerge from a complex interaction of genes and environment. The comparison of genetic enhancement with upbringing suggests that we were all designer children. Prospective parents who avail themselves of genetic engineering, PGD, or cloning are simply making use of another means of design.

**Are designer babies “posthumans”?**

***Some think we will lose our humanity if we modify human genes.***

Opponents of the liberal argument for enhancement argue that there are morally significant differences between upbringing and genetic enhancement. Francis Fukuyama thinks that genetic enhancements may change our descendents to such an extent that they lose their humanity.17 According to Fukuyama, environmental influences operate only within limits set by genes, meaning that even ambitious education programs leave their subjects’ humanity intact. A genetically enhanced child is more fittingly described as a “posthuman.” The price for her super intelligence will be the experiences that give human lives meaning.

***Are geniuses accidental posthumans because they’re above the norm?***

We might ask whether there are already posthumans among us. Albert Einstein and Ray Charles achieved well beyond the norm in their areas of endeavour. Some of the explanations for this achievement may be traced to their genomes. Would a parent who modified her child’s genome so that it contained some of the genetic advantages of Einstein or Charles be taking the first step toward posthumanity? If we answer this question in the affirmative, should Einstein and Charles be considered accidental posthumans?

***Transhumanists see designer babies as a goal rather than an issue.***

The most forthright response to the concern that genetic enhancement might deprive our descendents of their humanity comes from a group of thinkers who call themselves “transhumanists.”18

* Transhumanists propose posthumanity as a goal rather than something to avoid.
* They allow that we may have difficulty relating to the inhabitants of the biotechnological future but claim that if they are free of disease, super-intelligent, and routinely compose symphonies whose brilliance surpasses that of Beethoven’s Ninth, this failure of identification is our problem, not the posthumans’.